$GH+FH=\frac{2AE\times AB}{2AB}$ or $=AE$. The same result would follow wherever, in the base AB, the point H is taken so that $FH+HG$ is constant and equal to AE or BD. Q. E. D.

This problem was also solved in an elegant manner by *J. A. Calderhead, Charles E. Myers, Professor G. B. M. Zerr, P. S. Berg,* **and** *Professor H. C. Whitaker.*

PROBLEMS.

21. Proposed by CHARLES E. MYERS, Canton, Ohio.

A cistern 6 feet in diameter contains 3 inches of water. If a cylinder, four feet long and one foot in diameter, be laid in a horizontal position on the bottom, to what height will the water rise?

22. Proposed by J. A. TIMMONS, St. Marys, Kentucky.

Given, the perimeter of a triangle $=100(2s)$, the radius of the inscribed circle $=9(r)$, and the radius of the circumscribed circle $=20(R)$; it is required to find (1) the sides of the triangle, (2) the radius of the circle circumscribing the triangle formed by bisecting the exterior angles of the original triangle, (3) the area of the triangle thus formed; all in terms of R, r, s.

23. Proposed by E. L. PRATT, Tecumseh, Nebraska.

The ordinate of the point P of an ellipse is produced to meet the circle described on the major axis as diameter at Q. CQ, the straight line joining Q and the center of the ellipse, is tangent to the circle described on the focal radius of P as diameter.

If θ is the excentric angle of P prove that

$$\sin 2\theta=\frac{2(2a+b)\pm4\sqrt{a(a+b)}}{a-b}$$

24. Proposed by T. W. PALMER, Professor of Mathematics in the University of Alabama.

Two right triangles have the same base, the hypotenuse of the first is equal to 60, of the second 40. The point of intersection of the two hypotenuses is at the distance 15 from the base. Find the length of the base.

25. Proposed by L. B. FRAKER, Weston, Ohio.

The sides of a quadrilateral board are $AB=7$ inches, $BC=15$ inches, $CD=21$ inches, and $DA=13$ inches; radius of inscribed circle is 6 inches. (1) What are dimensions of the largest rectangular board that can be cut out of the given board, (2) largest square, (3) largest equilateral triangle? (Please solve without use of the calculus.)

26. Proposed by J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

$ABCD$ represents a rectangle, and $ABEF$ a trapezoid which is perpendicular to the rectangle, both figures having the side AB common to each other, and ADF and BCE forming two right triangles perpendicular to the rectangle $ABCD$. To determine the conoidal surface $CDFE$ so as to satisfy the condition that any plane laid through AB will intersect it in a straight line. Also find volume of the solid thus formed.

27. Proposed by ADOLPH BAILOFF, Durand, Wisconsin.

A line BE, that bisects an angle exterior to the vertical angle of an isosceles triangle is parallel to the base AC.